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EXAMINER	
SONG, SARAH U	

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 11/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/090,305	BEOM ET AL.	
	Examiner	Art Unit	
	Sarah Song	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-55* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 March 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. Figures 1-5B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: in line 12, of page 4, Examiner suggests changing "Fig. 1" to –Fig. 3–.

Appropriate correction is required.

Claim Objections

4. Claims 2, 7 and 55 are objected to because of the following informalities: in claim 2, line 3, Examiner suggests the insertion of –to—before "quantify"; in claim 7, "the glass substrate" lacks proper antecedent basis; in claim 55, line 3, Examiner suggests changing "sensor" to –imaging system—to provide proper antecedent basis for the limitation. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salamon et al. (U.S. Patent 5,991,488) in view of Bendett (U.S. Patent 5,677,769). Salamon et al. discloses a waveguide-plasmon resonance sensor for analyzing a sample placed adjacent to a conductive thin film, comprising:

- a conductive thin film 12 for providing surface plasmons;
- a dielectric medium 16 disposed at one side of the conductive thin film;
- a light source 24 for emitting an incident light beam to the conductive thin film 12 through the dielectric medium 16;
- a dielectric thin film 32 deposited at the surface of the conductive think film 12 opposite to the dielectric medium 16 to act as a waveguide of surface plasmon waves (see column 6, lines 37-41) and having a surface on which a sample is immobilized (see column 6, lines 44-48); and
- a photodetector 26.

Salamon et al. additionally discloses that the dielectric thin film acts as an amplifier (column 7, lines 15-21). Salamon et al. does not explicitly disclose the dielectric thin film to be doped with active ions capable of fluorescing by being excited with the incident light beam, and the photodetector for receiving and determining the intensity of fluorescence from the active ions.

7. Bendett discloses an optical sensor utilizing a waveguide (dielectric thin film) doped with active ions such as erbium, capable of fluorescing by being excited with an incident light beam (see column 3, lines 17-19). Bendett discloses that by using such a

device, changes in a material to be sensed are enhanced by the inherent gain characteristics of the waveguiding medium (column 4, lines 24-31). Bendett additionally discloses a photodetector, such as a CCD, photodiode array for receiving and determining the intensity of fluorescence from the active ions (column 3, lines 27-36).

8. It would have been within the level of ordinary skill in the art to recognize that the rare earth (active ion) doped waveguide of Bendett has the function of an optical amplifier, which increases the signal intensity of the detected light signal, and therefore results in an increased sensitivity of the optical sensor (column 4, lines 24-31). Salamon et al. discloses the dielectric thin film 32 as manifesting the function of an optical amplifier that increases the sensitivity of the optical sensor. Since both Salamon et al. and Bendett disclose optical amplifiers for increasing the sensitivity of an optical sensor, and Bendett discloses an active ion doped dielectric layer as a known optical amplifier for increasing the sensitivity of an optical sensor, it would have been obvious to one having ordinary skill in the art to substitute the dielectric thin film of Salamon et al. with the rare earth (active ion) doped waveguiding layer of Bendett.

9. Regarding claim 2, it is known that the optical sensors utilizing fluorescent emission are known to comprise a photodetector that determines a change in refractive index of the sample from the intensity of the fluorescence to quantify and qualify the sample or to determine the thickness of the sample. Therefore, one of ordinary skill in the art would have found it obvious to utilize the known photodetector to receive the excited light (fluorescence) from the active ion doped dielectric layer as requisite for detecting the excited light and determining a change in the sample therefrom.

10. Regarding claims 3-6, Salamon et al. discloses that the light source emits a transverse magnetic polarized light or transverse electric polarized light, and emits a laser beam as the incident light beam (column 7, lines 9-21) and discloses the conductive thin film to be formed from gold or silver and having a thickness of 45-55 nm (column 6, lines 23-25).

11. Regarding claim 7 and 9, Salamon et al. does not explicitly disclose an additional glass substrate between the conductive thin film 12 and the dielectric medium 16. It would have been within the level of ordinary skill in the art to apply the conductive thin film 12 to a glass substrate as being well known in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the conductive thin film to the glass substrate, instead of directly on the prism of Salamon et al., since applicant has not disclosed that the additional glass substrate solves any stated problem or is for any particular purpose, and it appears that the invention would perform equally well with the additional glass substrate. Furthermore, Salamon et al. does not explicitly disclose an index matching oil layer. Index matching oil layers are well known in the art for preventing spurious reflections at optical interfaces. Therefore, it would have been obvious to one having ordinary skill in the art to provide the index matching oil layer between the dielectric medium and the glass substrate to provide a loss-free optical path between the dielectric medium and the glass substrate.

12. Regarding claim 8, Salamon et al. does not explicitly disclose a Cr or Ti layer to increase adhesion between the conductive thin film and the glass substrate. Cr and Ti layers are well known in the art to improve adhesion of metal coatings onto glass substrates. Therefore, it would have been obvious to one having ordinary skill in the art

to provide the Cr or Ti layer between the conductive thin film and the glass substrate to improve adhesion of the conductive thin film to any glass substrate.

13. Regarding claim 10, Salamon et al. does not explicitly disclose the type of optical photodetector. Photodiodes, photomultipliers, charge coupled device and photosensitive sheets are all well-known photodetectors in the art as evidenced by Bendett. It would have been obvious to use any well known photodetector since applicant has not disclosed that the particular photodetector solve any stated problem or is for any particular purpose and it appears that the invention would perform equally well with any well known photodetector.

14. Regarding claim 11, Salamon et al. discloses the dielectric medium in the form of a triangular prism. Salamon et al. does not explicitly disclose a trapezoidal prism. However, it is noted that the apex of the triangular prism is not utilized, and therefore is not required. A trapezoidal prism is merely a truncated triangular prism, and would have been obvious to one having ordinary skill in the art to reduce the size and cost of the device by eliminating unnecessary portions of the prism.

15. Regarding claims 12 and 13, Salamon et al. does not specifically disclose a filter or a condensing lens. Filters are known in the art for selectively allowing optical signals to pass. Condensing lenses are known in the art for reducing the spot size of an optical signal. It would have been obvious to one having ordinary skill in the art to additionally provide a filter to ensure that only the monitor light beam reaches the photodetector and thus reducing signal to noise ratios. It would have been obvious to one having ordinary skill in the art to additionally provide a condensing lens to reduce the spot size of the

monitor signal, which resultantly would require only a small active area of the photodetector thereby keeping device size and cost to a minimum.

16. Regarding claims 14 and 15, Salamon et al. discloses the incident light beam to be incident onto the conductive thin film at a fixed incident angle (column 9, line 14) and discloses the dielectric thin film to be formed of SiO_2, for example (column 6, line 42). Bendett discloses the doped medium to be formed of SiO_2, for example, as well (column 3, line 7).

17. Regarding claim 16, as stated above, Bendett discloses rare earth ion doping.

18. Regarding claims 17-25, it is noted that rare earth ions, such as Er^{3+} ions, inherently have the ability to fluoresce by emitting light of a shorter wavelength than the incident light beam through two-photon or three-photon absorption. Specifically regarding claims 18-25, Salamon et al. and Bendett do not specifically disclose the various active ions, excitation wavelengths, and incident light beam wavelengths. However, Bendett does disclose that the particular active ion doping can be selected to provide emission light within a desired range, and thus optimize the sensor to sense various conditions. Therefore, it would have been obvious to one having ordinary skill in the art to select any of the well-known active ions or combinations thereof, and the appropriate excitation wavelengths, which would have been within the level of ordinary skill, to optimize the sensor for specific conditions as suggested by Bendett.

19. Regarding claims 26 and 27. Salamon et al. discloses the dielectric thin film to be thick enough to produce a coupled plasmon-waveguide resonance mode and attenuated total reflection leaky mode coupled to surface plasma resonance, i.e. a thickness of 100-700 nm, in column 6, lines 37-43.

20. Regarding claim 28, Salamon et al. discloses a liquid sample 20, and the sensor further comprising a sample holder 36. Salamon et al. does not specifically disclose a pump. A pump would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a uniformly dispersed sample solution.

21. Regarding claims 29-55, Salamon et al. in view of Bendett discloses or renders obvious all of the claimed limitations as discussed above with regards to claims 1-28, but does not specifically disclose conductive film arrays. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the conductive film arrays, in place of the single conductive film, since it has been held that mere duplication of essential working parts of a device only involves routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents 4,889,427; 4,844,613; 5,539,681 which were discussed in the specification of the present application, are cited on the PTO-892.

23. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

24. Any inquiry concerning the merits of this communication should be directed to Examiner Sarah Song at telephone number 703-306-5799. Any inquiry of a general or clerical nature, or relating to the status of this application or proceeding should be directed to the receptionist at telephone number 703-308-0956 or to the technical support staff supervisor at telephone number 703-308-3072.

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